munication with distant stations from a motor-bus in motion. The aerial fixed on the bus was only a rectangular coil about 3 ft. square, containing a few turns of wire. The bus drove some miles towards Colchester, and then its position was accurately located by the Marconi direction-finding device, which was so useful in other days for locating the position of enemy aircraft. Now it promises to be very useful in connection with navigation by sea and air. In the English Channel, for instance, a ship furnished with direction-finding gear can check its position at frequent intervals by taking bearings on the numerous shore wireless stations without disturbing them in their work. The relative position of other ships also can be ascertained, and the dangers of navigation in fog greatly lessened.

The Marconi Co. is erecting a huge aerial in Buenos Aires, and it seems probable that in two or three years' time telephonic speech will be possible between this country and the Argentine. Unlike ordinary telephonic waves transmitted over wires which travel with speeds depending on their wave-lengths, aerial waves all seem to travel with the same speed, and so it is highly probable that, even over this distance, there will be no "speech distortion."

THE ATLANTIC FLIGHT.

The American seaplane N.C.4 has completed its flight to England, *via* the Azores and Portugal, and arrived at Plymouth at 1.26 p.m. G.M.T. last Saturday. The honour of the first Atlantic crossing by air thus falls to the Americans, though the yet greater honour of the first direct flight from continent to continent remains to be won. The feat accomplished by the N.C.4 clearly illustrates the advantage of the seaplane for long flights over the ocean, owing to its ability to alight on the water in any calm locality and carry out minor repairs, if necessary. Even in mid-Atlantic such an aircraft would have a fair chance to rectify some slight defect and proceed on its course, whereas an aeroplane is certain to be useless for further flight if forced to descend on the water.

The three longest stages of the flight of the N.C.4 were as under:—

	Miles
Newfoundland to the Azores ...	1381
Azores to Portugal	904
North of Spain to Plymouth ...	500

The machine also made a flight of 190 miles in the Azores, and proceeded from Lisbon to the North of Spain in two short stages before making the final flight to England. The last 500 miles were accomplished in 5 hours, a fact that speaks well for the condition of the machine after its preceding long journeys. The seaplane was obliged to fly very low on account of fog, and the greater part of the last stage was covered at an altitude of less than 100 ft. The satisfactory termination of this trans-Atlantic flight reflects the greatest credit upon Lt.-Commdr. Read and his crew, who will ever be remembered as the first persons to cross the Atlantic by air.

In view of the length of the first stage of this historic flight, viz. 1381 miles, it seems reasonable to expect that a machine of this type should soon be able to attempt the direct passage—a distance only 420 miles greater than that already accomplished. An aerial voyage from England to Australia also seems well within the reach of such a seaplane, convenient harbours or lakes *en route* being selected as halting-places. A seaplane has the disadvantage, for such a flight, that a forced landing on *terra firma* is as fatal as is a descent at sea to an aeroplane, and it is conceivable that the future will produce a machine capable of alighting either on water or land. Such a machine would have vast possibilities, but the design presents many difficulties.

Meanwhile, another great triumph has been added to the record of flight, and it seems likely that the present year will witness even greater achievements in the aeronautical world.

NOTES.

The honours announced on the occasion of the King's birthday on June 3 number several thousand, but are confined almost entirely to the fighting forces. A further list will be issued in a few days. We notice in the list published on Tuesday the following distinctions conferred upon men known in the scientific world:—*K.C.S.I.:* Dr. Michael E. Sadler, Vice-Chancellor of the University of Leeds and chairman of the Calcutta University Commission. *C.I.E.:* Lt.-Col. J. Stephenson, principal and professor of biology, Government College, Lahore, and Mr. R. S. Hole, Imperial Forest Botanist, Dehra Dun. *Knights Bachelor:* Mr. Charles Bright and Dr. J. H. MacFarland, Chancellor of the University of Melbourne.

With the approval of H.R.H. the Duke of Connaught, president of the Royal Society of Arts, the council has awarded the society's Albert medal for 1919 to Sir Oliver Lodge "in recognition of his work as the pioneer of wireless telegraphy." The medal was instituted in 1864 to reward "distinguished service in promoting arts, manufactures, and commerce." The presentation will be made by the Duke of Connaught at Clarence House on June 6.

The annual visitation of the Royal Observatory, Greenwich, will be held on Saturday, June 14.

Lord Bledisloe has been elected chairman of the governors of the Royal Agricultural College, Cirencester, in succession to Lord Moreton, who has resigned.

Dr. Joseph Burrell, who, after serving for five years as assistant professor of geology at Yale University, was appointed to a full professorship in 1908, died recently in his fiftieth year.

Mr. Harold King, of the Wellcome Chemical Research Laboratories, has been appointed by the Medical Research Committee to the post of organic chemist in the department of biochemistry and pharmacology.

A conference on "The Benefit to the Workman of Scientific Management" will be held under the auspices of the Industrial Reconstruction Council on June 10, at 5.30 p.m., in the hall of the Institute of Journalists, 2 and 4 Tudor Street, E.C.4. The chair will be taken by Dr. H. Chellew, and Major Pells, R.E., will introduce the subject, after which the discussion will be open. No tickets are necessary.

The seventy-first general meeting of the Institution of Mining Engineers will be held in the rooms of the Geological Society, Burlington House, on Thursday, June 19, under the presidency of Mr. G. B. Walker. Two institution medals will be presented for the year 1918–19 to Dr. Auguste Rateau (French) and M. Victor Watteyne (Belgian) respectively.

A biologist having a knowledge of life in streams is about to be appointed by the Joint Committee of the Board of Agriculture and Fisheries and the Road Board to assist in experiments in connection with the tarring of roads. Applications for the post, marked "Biologist," must reach the Secretary of the Road Board, 35 Cromwell Road, S.W.7, by, at latest, the first post of Monday, June 16.

Applications are invited by the Imperial Mineral Resources Bureau (14 Great Smith Street, S.W.1) for the position of Chief of the Intelligence and Publications Section of the Bureau to compile and produce for publication statistical information in regard to the resources, production, and cost of production of metals and minerals from all parts of the world. The forms of application, with testimonials, are returnable by, at latest, June 19.

The death is announced, in his eightieth year, of Dr. Alexis A. Julien, of South Harwich, Mass. From 1860 to 1864 Dr. Julien was the resident chemist on the guano island of Sombrero, and made scientific collections there for the Smithsonian Institution. From 1865 to 1909 he was on the staff of the School of Mines, Columbia University. He had also been connected with the Geological Surveys of the States of Michigan and North Carolina.

The annual meeting of the British Science Guild will be held on June 17, at 4 p.m., at the Goldsmiths' Hall, by kind permission of the Master and Court. The speakers will be the Right Hon. Lord Sydenham (president of the guild), Major-Gen. the Right Hon. J. E. B. Seely, Under-Secretary of State, Ministry of Air, Sir Joseph Thomson, president of the Royal Society, and Sir Robert Hadfield, Bart. Cards of invitation to the meeting may be had on application to the Secretary, British Science Guild, 199 Piccadilly, W.1.

A portion of the Ministry of Munitions has become a branch of the Board of Trade. The portion that is transferred to the Board of Trade will deal with questions of assistance to, and organisation of, the optical scientific instrument, glass, and potash industries, including administration of the Glass Control (Consolidated), Clinical Thermometer, and Potassium Compound Orders. All communications relating to such questions in future, therefore, should be addressed to the Assistant Secretary, Board of Trade, Industries and Manufactures Department, Scientific Instruments, Glassware, and Potash Production Branch, 117 Piccadilly, W.1.

At the annual general meeting of the Linnean Society, held on May 24, the following were elected officers and council for the ensuing year:—*President:* Dr. A. Smith Woodward. *Treasurer:* H. W. Monckton. *Secretaries:* Dr. B. Daydon Jackson, E. S. Goodrich, and Dr. A. B. Rendle. *Council:* E. G. Baker, Dr. W. Bateson, *Prof. Margaret Benson, *E. T. Browne, R. H. Burne, S. Edwards, Prof. J. B. Farmer, E. S. Goodrich, Dr. B. Daydon Jackson, C. C. Lacaita, *G. W. E. Loder, H. W. Monckton, R. I. Pocock, Dr. A. B. Rendle, Dr. D. H. Scott, Miss A. Lorrain Smith, A. W. Sutton, *Dr. Harold Wager, Lt.-Col. J. H. Tull Walsh, and *Dr. A. Smith Woodward (new members are shown by an asterisk). Prof. I. Bayley Balfour was presented with the Linnean medal in gold.

A conference devoted to the consideration of problems of reconstruction in relation to public health has been arranged by the Royal Institute of Public Health, to be held from Wednesday, June 25, to Saturday, June 28, inclusive. The inaugural meeting of the conference will be held in the Egyptian Hall of the Mansion House, under the presidency of the Right Hon. the Lord Mayor of London, and the other meetings will be held in the Council Chamber of the Guildhall of London. The subjects to be considered will come under the following heads:—(1) The Work of the Ministry of Health; (2) The Prevention and Arrest of Venereal Disease; (3) Housing in Relation to National Health; (4) Maternity and Child Welfare; and (5) The Tuberculosis Problem under After-War Conditions.

In view of the imminent resumption of international co-operation in the study of questions connected with the art of illumination and the sciences related thereto, a meeting of the National Illumination Committee of Great Britain was held on May 27, when vacancies in the executive of the committee, due to the decease of Mr. W. Duddell and Prof. Silvanus P. Thompson, were filled. The executive, with the institutions represented, is now as follows:—Chairman, Mr. A. P. Trotter (Illuminating Engineering Society); vice-chairmen, Mr. John Bond (Institution of Gas Engineers) and Mr. Kenelm Edgcumbe (Institution of Electrical Engineers); hon. secretary, Mr. Haydn T. Harrison (Institution of Electrical Engineers); hon. treasurer, Mr. W. J. A. Butterfield (Institution of Gas Engineers); and representatives on the executive committee of the International Commission on Illumination, Dr. Harold G. Colman (Institution of Gas Engineers) and Mr. Leon Gaster (Illuminating Engineering Society). The resumption of research work, etc., was considered, and a programme for further discussion at a meeting at an early date was settled.

The Air Ministry has begun the publication, in the *Geographical Journal* for May (vol. liii., No. 5), of some notes on proposed air routes. The first one is the route from Egypt to South Africa. From Cairo to Kosti there seems to be little difficulty: either the Nile or the railway indicates the course. South of Kosti is a forest region, and the Nile banks are wooded or swampy, while the sudd region makes the White Nile a practically impossible route. The route proposed is by Sennar up the Blue Nile to Roseires, thence south to Gambela and the western shore of Lake Rudolf; or from Roseires by Nasser on the Sobat to Gondokoro. But on either route landing-places are not numerous and communications are bad. It is suggested that a seaplane might be the best type of machine for this section. A seaplane is also favoured for the route from Gondokoro to Lake Victoria by Murchison Falls. Across Lake Victoria the proposed route is to Mwanza by seaplane, thence to Kigoma and Abercorn on Lake Tanganyika. The route continues by Broken Hill to Bulawayo, thence following the railway to Mafeking, Kimberley, and Cape Town. Alternative routes are suggested for parts of the course. It is proposed to provide landing-places, so far as possible, every 200 miles. The Air Ministry states that it will be glad to receive criticisms and remarks.

Dr. Charles Goring, late Medical Officer to Manchester Prison, whose recent death after a short illness deprived the Prison Medical Service of one of its ablest members, had a brilliant career as a student at University College, London, and from his early years showed a strong bent towards scientific research. This tendency led him to the study of medicine, and his special interest in psychology and general anthropology found an ample field of work when he was appointed to the staff of Broadmoor Criminal Lunatic Asylum, and later to the Prison Medical Service. During several years Dr. Goring contributed a vast number of observations to an inquiry which had been undertaken at several prisons concerning certain doctrines as to the relation of crime to physical and mental peculiarities, and he readily undertook the great labour entrusted to him of tabulating the whole of the observations made and of writing the report. This report was published by the Government under the title "The English Convict: A Statistical Study," and has attracted wide attention, both here and in other countries, among those interested in the study of crime and criminals. It is impossible in this necessarily short notice to enter into further criticism of the method of research followed by Dr. Goring and of the conclusions arrived at by him than that made in Nature for March 26, 1914 (vol. xciii., p. 86), soon after the publication of this work. It must suffice to say that the nature and arrangement of the material and the inferences drawn therefrom follow closely on the lines of the biometrical school, and that the validity of the conclusions depends on the full acceptance of the applicability of the method to the material. Dr. Mercier's recent book on "Crime and Criminals" shows that much can be said on this subject from a point of view which differs widely in many respects from that set forth in "The Statistical Study of the English Convict"; but, looked at from any point of view, this work will remain as a monument to Dr. Goring's untiring industry, his single-minded enthusiasm for scientific research, and his unquestionably great ability.

Under the title of "The Dendroglyphs, or Carved Trees of New South Wales," Mr. R. Etheridge has published a memoir, issued by the Department of Mines (Memoirs of the Geological Survey of New South Wales, Ethnological Series, No. 3). The records of these trees begin with a note by Surveyor-General J. Oxley in 1817, and since that time many specimens have been discovered. They seem to fall into two groups—those which adjoin native graves, and may be considered memorials of the dead or of some important tribal event; and those carved with symbols, apparently in connection with the Bora, "man-making" or puberty rites. They do not appear to be associated with tree-worship or with any regular cult of the dead. Some of the designs may be of a totemic nature, and they have been compared with those engraved on the inside of skin-cloaks worn by the aborigines. As to the date of these memorials, all that seems clear is that the glyphs were made after the natives became possessed of metal tools. Very little is known of the class of records associated with the Bora rites, but some of the designs seem to be totemistic. An attempt is made, without much success, to compare the designs used by Dravidian tribes in southern India, with whom the Australians are supposed to be racially connected. The memoir is interesting and well illustrated, and raises many questions in connection with the beliefs and ceremonies of the natives of Australia.

Dr. A. Gallardo continues his extensive memoir on the ants of the Argentine with a monograph on the Ponerinæ (Ann. Mus. Nac. Hist. Nat. Buenos Aires, vol. xxx., 1918). To the thirty species comprised in this section he devotes more than a hundred pages of careful description with clear structural figures.

The greater portion of part 5, vol. xv., of the Records of the Indian Museum is occupied by the second instalment of Mr. E. Brunetti's "Revision of the Oriental Tipulidæ." Nearly six hundred species of these insects (the crane-flies or "daddy-long-legs") are now known from India and south-eastern Asia, so that the field of study is extensive. Mr. Brunetti's treatment is somewhat rigidly systematic.

Mr. J. M. Swaine issues, as Bulletin 14 of the Entomological Branch of the Canadian Department of Agriculture, what may be regarded as a monograph of the Canadian bark-beetles (Scolytidæ), dealing with structure, classification, habits, and methods of control. A feature of this memoir is the beauty of the illustrations, though some of the plates are overcrowded with figures.

We have received the first part (January, 1919) of a "Treubia," a new publication issued from the famous Botanical Garden of Buitenzorg, Java. It contains five entomological papers by Dr. W. Roepke, of which one on two new Javan species of Oligotoma is of bionomic as well as of systematic importance, the curious Embiidæ—allies of the Termites—to which these insects belong, being of exceptional interest. In his other papers, on various beetles and wasps, the author gives much welcome anatomical detail.

Some interesting contributions to agricultural zoology have lately been made by workers in India. The report of the Imperial Entomologist (Mr. T. B. Fletcher) for 1917–18 contains descriptions, with excellent figures, of the larval stages of several beetles and moths of economic importance. Dr. E. J. Butler writes (Mem. Dept. Agric. India, Bot. Series, vol. x., No. 1, 1919) on the rice worm (*Tylenchus angustus*), and points out that this destructive eelworm can migrate over apparently dry surfaces if the atmosphere be saturated so as to cause the formation of a droplet or film of moisture around the worm's body. This fact accounts for the general immunity of the "boro" or spring rice crop to the disease caused by the worm, as the air is at its driest from February to May. A valuable paper on the Aphididæ of Lahore by the late Mr. Bachambar Das appears as No. 4 of vol. vi. of the Memoirs of the Indian Museum. Forty species are described, with critical systematic and bionomic notes, illustrated with sixteen plates. The work shows high entomological ability, and the early death of the author, resulting from his devotion to students attacked by cholera, has cut short a career of great promise.

Recent geological work in France and her colonies is usefully reviewed by M. J. Révil in the *Revue générale des Sciences* (January 15 and 30, 1919).

In *Naturen* for November, 1918, Hr. N. H. Kolderup records the excursions of the first Scandinavian Geological Congress in Denmark, and furnishes a good map, after V. Nordmann, of the concealed geology of the north of Jylland (Jutland). The strata range from Senonian to Miocene.

The great size of the boulders in the rubble-drift of Brighton leads Mr. E. A. Martin to conclude (*Hastings and E. Sussex Naturalist*, vol. iii., p. 64) that some form of moving ice occupied the local valleys at the time of deposition of this drift. The paper provides further evidence of the influence of the Glacial epoch on the older superficial deposits of southern England.

MR. A. L. HALL furnishes a complete review of the minerals used as asbestos and of the requirements of the trade in a memoir on "Asbestos in the Union of South Africa" (Mem. 12, Geol. Surv. S. Africa, 1918, price 5*s*.). Crocidolite naturally receives full treatment, and the author's new species amosite, with a long, flexible, and strong fibre, is recommended as being less fusible than crocidolite, which contains more soda. Amosite, indeed, seems to rival chrysotile in its commercial qualities.

PROF. W. M. DAVIS contributes a further comprehensive paper on "The Geological Aspects of the Coral-reef Problem" to *Science Progress* (vol. li., p. 420, 1919). Mr. W. G. Foye, in a memoir on "Geological Observations in Fiji" (Proc. Amer. Acad. Arts and Sciences, vol. liv., No. 1, 1918), states that he finds no evidence of the wave-cut Pleistocene platform which is postulated by Prof. R. D. Daly in his theory of the post-Glacial origin of the reefs, and he remarks that "if the Glacial-control theory is still adhered to, the atolls must be pre-Pleistocene in age." The Fiji area shows that elevation has here taken place in differing degrees, leading to various states of erosion. At present "all of the islands are being rapidly reduced to sea-level by atmospheric solution." Subsidence has already followed on the last uplift, and some of the most eroded islands have, in consequence, deep lagoons.

A "TSUNAMI" is the name given in Japan to any abnormally high water that causes damage to property. Most "tsunamis" are due to submarine earthquakes or volcanic eruptions. The sea-level then suddenly rises or falls, after which a train of waves succeeds, which may last a few hours or days. Other "tsunamis" are caused by heavy winds along the coast or by typhoons. These different forms of "tsunamis" are considered by Mr. S. T. Nakamura in a paper read before the Tokyo Mathematico-Physical Society (Proceedings, vol. ix., 1918, pp. 548–55), in which special reference is made to the "tsunami" caused by an earthquake off the eastern coast of North Japan on September 8, 1918. Mr. Nakamura explains the wide variation in the height of the waves by supposing that movements in adjacent quadrants are opposite in direction, so that the height of the waves would be zero or very small on the boundaries of the quadrants, and greatest along their central lines. The evidence of the recent "tsunami," so far as it goes, favours this explanation.

THE Danish Meteorological Institute has published its report for 1918 on the state of the ice in the Arctic Seas. The year was a very favourable one for navigation to Spitsbergen. From April until October the west coast was practically free from ice, except for a little around the South Cape in May and June, and a good deal of pack in Bell Sound and Horn Sound in September. The east coast, so far as reports go, seems to have been fairly open late in the summer, and the north coast from June onwards was navigable. In the Greenland Sea, on the other hand, the ice reached far eastward, and seems to have been unusually heavy. Conditions in the Barents Sea and around Iceland seem to have been fairly normal. There was little information from the Kara Sea, except the report of Capt. Amundsen, who found it filled with ice in the middle of August. The entrance to the White Sea was not navigable before May, but the sea remained open until late in the autumn. The report, which is printed, as usual, in Danish and English, is well illustrated with maps.

BULLETIN No. 105 of the University of Illinois contains an account of hydraulic experiments with valves, orifices, hose, nozzles, and orifice buckets. Ordinary gate, globe, and angle valves were purchased in the open market and tested as received; the valves were 1 in. and 2 in. in diameter, and were tested with settings ranging from one-fourth open to full open. It was found that the loss of head caused by small valves varies as the square of the velocity in the pipe for all the valve openings. When wide open, a globe valve causes more than twice as much loss of head as an angle valve of the same size; while a gate valve causes much less loss of head than either a globe or an angle valve, the velocity in the pipe being the same in the three cases. With equal velocities in the pipe, the loss of head for an angle valve is somewhat less when about three-fourths open than when wide open. The form or shape of the passageways through a globe or angle valve has a large influence on the loss of head for the small valve openings; the portion of the passageways in which the form seems of greatest importance is in the exit from the valve rather than in the passageways leading to the valve disc. Graphs of the results and tables of the coefficients obtained are included in the paper.

IN an address given to the chemical section of the American Association for the Advancement of Science in December last, Prof. W. A. Noyes emphasises the fact that the theory of valency is one of the most important theories in chemistry. Scarcely any other except the atomic theory, with which it is inseparably connected, has been so fruitful in results which have led to practical applications, and also to the development of chemical knowledge. But in spite of these results, which no one can dispute, the theory just now is more or less in disrepute, especially among physical chemists and teachers of inorganic chemistry. In many elementary text-books structural formulæ are used so sparingly that they make no impression on the student, and in some they are not even mentioned. This attitude is due, in part, to a reaction from the over-emphasis given to the subject at a time when nearly all chemists were working on the structure of organic compounds. In part also it is due to confused ideas on the philosophy of science; to some persons science is only an orderly description of phenomena which we can see and handle, weigh and measure, and connect by mathematical processes. But the positive achievements of the valency theory are so great that no one can doubt that there is in the relations of atoms some reality which corresponds with the theory. At the same time our knowledge is vague and indefinite at many points, so that we cannot yet consider the theory satisfactory. The most important recent advance has been the interpretation of valency in connection with the electron theory, and the beginning which has been made towards the study of positive and negative atoms in organic compounds. As a basis for the better understanding of valency there is need for a more definite knowledge of the structure of atoms. Whatever other conclusions may be reached, it seems certain that this structure will be found to be dynamic rather than static; it is hard to conceive of a quiescent electron.

As is well known, the industry of ferro-cerium flints was practically in the hands of Germany when war broke out. Since then one French manufacturer has succeeded in establishing the industry in France on a scale sufficient to supply the requirements of that country. In the January–February issue of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* some interesting details are given on the manufacture of these stones or "flints," which are now so well known to smokers in this country. Ferro-cerium is an alloy consisting, for the purpose under discussion, of 30 parts of iron to 70 parts of cerium. The raw material is derived from the monazite sands of Brazil. These sands are enriched until the pure monazite is obtained. They are then treated chemically to extract the oxylate of thorium, phosphoric acid, and oxylates of cerium, lanthane, and didymium. The cerium oxylates are afterwards converted into hydrates or carbonates, then into chlorides. The chloride is finally electrolysed and decomposed into its elements, chlorine and cerium, the electrolytic process being continuous. The pure cerium is alloyed to iron in the proportions mentioned above. The two substances are placed in fire-clay crucibles, which are heated to 1100° C. by a gas furnace. When the alloy is thoroughly liquid it is cast in moulds formed by a series of several hundred sheet-iron tubes, 2·8 mm. in diameter and 30 cm. long. These tubes are allowed to cool in the air and then "stripped," *i.e.* they have an opening down the side and the thin sheet-iron is simply wound off the ferro-cerium, which is left in the form of a thin rod. One kilogram of ferro-cerium contains 5500 "flints" of 5 mm. length, which are each capable of giving some nine hundred flashes. The French manufacturer who took up this industry has also prepared other products of some importance, *e.g.* thorium nitrate, which is being used in a special type of incandescent lamps, and cerium, which is being used for the manufacture of cerium steels. This new application on the part of the French will release them from the German tribute after the war.

M. LÉON APPERT, in the January–February issue of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale,* contributes a long and interesting paper on the welding of glasses. He traces the history of these attempts from the earliest ages, and considers the technical methods most likely to lead to success. His conclusions are:—(1) That it is always possible to weld together, completely and permanently, glasses of different composition, whatever the constituents of the glasses. (2) That the limits within which the relative proportions of these constituents may be varied are very close; and, to ensure success, the modifications which may result must be carefully borne in mind in practice, such as changes in the quality of the products used, modifications in composition which may occur spontaneously, the temperature at which fusion is carried out, and the duration for which this temperature is applied. (3) As regards conditions of athermancy and diathermancy, the most simple methods should be used for controlling these conditions, a glass of known composition being used as a standard and for purposes of comparison. (4) As regards neutrality, direct experiments with the blowpipe should be made. This kind of test, which is very simple to carry out, gives at the same time information on the greater or less fusibility of the glass, and on the consequences arising out of the use of a variable temperature, which may sometimes be too high or applied too long. (5) As regards the welding of enamels with metals, the question of adhesion being of the first importance, care should be taken over the qualities of the mordant, which must have the same dilatation coefficient at the outset, and at the same time be capable of attacking the underlying metal with the view of multiplying the points of adhesion. (6) The enamel should be employed only in as thin layers as possible and by successive applications. If these conditions are observed, the success of the operation of welding may be regarded as ensured.

IN the *Journal of Agricultural Research* for December 2 last, Messrs. True and Geise give an account of a series of pot experiments carried out to determine the value of greensand (glauconite) deposits as a source of the potassium required by growing plants. Potassium is a normal constituent of glauconite; the question was whether in this silicate it is present in a sufficiently soluble form to be utilisable by the plant. In the result it was found that greensands and greensand marls from Virginia and New Jersey were able to supply sufficient potassium to meet the demands of wheat and red clover during the first two months of growth, *i.e.* at the time when the absorption of potassium is greatest. The plants, in fact, made a greater weight of "tops" than was found in similar cultures where the potassium requirements were supplied by means of the chloride, sulphate, and phosphate. The authors conclude that the deposits mentioned can apparently furnish available potassium to meet the needs of many farm crops, and perhaps of most.

A NEW form of ship's rudder, invented by Mr. J. G. A. Kitchen, of Lancaster, forms the subject of an article in *Engineering* for May 16. The invention permits the boat to be steered, reversed, controlled in speed, and manœuvred in any way from a single tiller, with the engines running continuously at full speed in the forward direction. Complete and direct control is obtained by the steersman over all movements during manœuvring, and all engine-reversing gear may be eliminated. Two curved deflectors forming parts of a circular cylinder partly enclose the propeller. The deflectors are pivoted at the top and bottom on common centres, and are capable of being swung together in the same direction, or equally in opposite directions. A graduated opening or no opening is thus provided for the stream of water leaving the propeller; in the case of no opening, the entire stream of water is deflected forwards, and the boat moves astern. There is a neutral position of the deflectors in which the boat remains at rest with engines working at full speed. The operating gear is exceedingly simple, so that even a novice acquires complete command over the boat's movements after a few minutes' practice. Many of the Admiralty pinnaces, etc., driven by oil-engines have been fitted during the war, although publication of particulars has been hitherto prevented. The following gives some idea of the importance of the device, and relates to trials of a 25 ft. launch belonging to the Air Ministry. Ahead speed, 9·80 knots; astern speed, 3·5 knots (sufficient for all requirements). Full speed ahead to dead stop: boat pulled up in 16 ft. (one man aboard). Time of turning through a complete circle, without progression in any direction: to starboard, 33 secs.; to port, 26 secs. The results for several other boats are given, and are equally good.

THE statement in a letter in last week's NATURE that Messrs. Newton and Wright, Ltd., produced interrupterless machines before "any American firm" had done so should have read "any other American firm." The word "other" was inadvertently omitted from the sentence. Mr. Snook's own factory was the first to place a practical machine on the market, and Messrs. Newton and Wright, Ltd., were the first on this side of the Atlantic.